

Crown lengthening and restorative treatment in mutilated molars

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Crown lengthening has been advocated as a treatment modality to restore teeth with a clinical crown reduced subsequent to different kinds of trauma. Multirooted teeth, however, present certain anatomic features, such as the furcation area and corresponding interradicular bone, the retromolar area, and the external oblique ridge, that may limit the possibility for soft tissue and bone reduction and minimize the effectiveness of crown-lengthening procedures. This article describes surgical modifications to overcome the anatomic difficulties that multirooted teeth present when crown lengthening is required. Furthermore, root resection is discussed as an alternative to conventional surgery when the latter is not possible. (Quintessence Int 1994;25:167-172.)

Introduction

Crown lengthening has been advocated as a treatment modality to restore teeth with clinical crown reduced subsequent to different kinds of trauma. This surgical approach would provide the necessary zone of healthy tooth structure coronal to the alveolar crest, able to accommodate a new gingival attachment complex and the crown margins without violating the biologic width of the periodontium. As a result, periodontal health can be preserved. Clinically, the application of this procedure has been well established and extensively discussed in the dental literature, especially for single-rooted teeth.¹⁻¹²

Multirooted teeth present certain anatomic features that are likely to complicate surgical and prosthetic treatment. Such features include the furcation area and the corresponding interradicular bone, the retromolar area, and the external oblique ridge. All of these may limit the possibility for bone reduction and minimize

the effectiveness of this approach. Nevertheless, multirooted teeth with a clinical crown reduced by subgingival caries or fracture may be critical distal abutments for a prosthesis or the only posterior teeth present in the quadrant. Their loss will consequently require the construction of a removable partial denture, rather unappealing to the patient, or the more demanding and costly placement of osseointegrated fixtures. Therefore, the possibility of saving these teeth through a modified approach of crown lengthening and proper periodontal and prosthetic management should be carefully taken into consideration.

The purpose of this article is to underline the importance and to discuss the indications and techniques for crown-lengthening procedures in multirooted teeth.

Surgical procedures

Special anatomic considerations

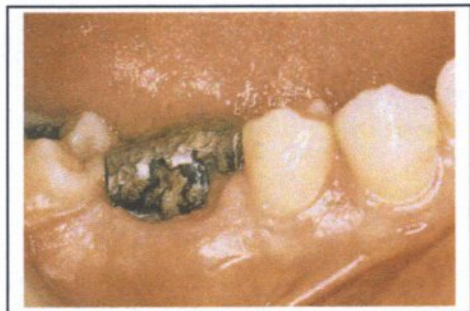
The purpose of surgical crown lengthening is to expose at least 3 to 4 mm of healthy tooth structure coronal to the alveolar crest.^{3,5,8-11} This can be achieved by surgical reduction of the soft tissues, provided that the distance between the tooth defect and the bone is adequate, or may also involve modification of the hard tissues if the defect is in close proximity to the bone. The most effective technique for the achievement of this goal is the apically positioned flap combined with

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Figs 1a and 1b Deep, buccal, subgingival fracture on the mandibular right first molar.

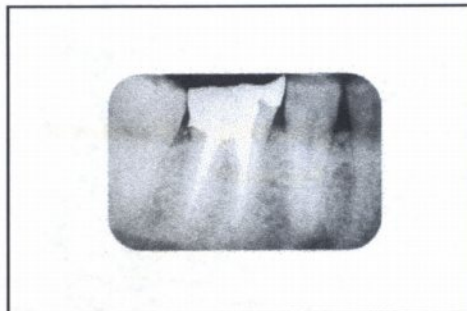


Fig 1b

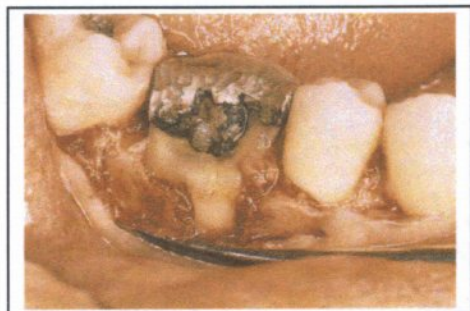


Fig 1c Preoperative bone morphology.

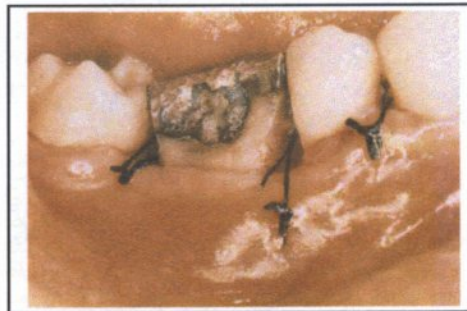


Fig 1d Bone morphology after ostectomy and osteoplasty to create 3 to 4 mm of healthy tooth structure from the alveolar crest to the fracture line. Care has been taken not to remove bone from the interradicular area, where only osteoplasty has been performed.



Fig 1e Apical repositioning of the flap with vertical sling suturing engaging the periosteum to ensure stability.



Fig 1f Two-month postoperative view with cast post and core.

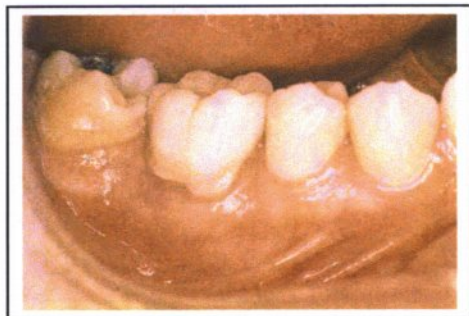


Fig 1g Final restoration. A small gingivoplasty with electrosurgery was necessary on the mesial root to ensure a proper finishing line for the restoration.

ostectomy and osteoplasty. It is the procedure of choice, because direct observation of bone is achieved, permitting the correct evaluation of the position of the defect and, if necessary, alveolar reduction (Figs 1a to 1g). If ostectomy is required, care must be taken not to remove bone from the interradicular area; such removal may lead to an iatrogenic class II furcation defect and possibly induce further periodontal destruction of the area. Ideally, ostectomy should preserve or create a bone architecture as close to physiologic as possible.^{13,14} The interradicular bone can be preserved by smoothing it with osteoplasty alone, however, without affecting the final outcome (Fig 1d). This approach requires that the tooth structure above the furcation be intact.

When the surgery is performed on mandibular molars, the existence of the external oblique ridge makes the apical repositioning of the buccal flap difficult, because the tissue has a tendency to move coronally after the reflection. To overcome this problem, vertical sling sutures that engage the periosteum are used so that the soft tissue can be stabilized apically, allowing for lengthening of the crown (Fig 1e).

If the distal surface of the molar must be lengthened, a distal wedge is necessary. Then, care must be taken at the tissue of the retromolar area. If it is alveolar mucosa, the apical repositioning is difficult, if not impossible, and crown lengthening often fails.

Crown lengthening and root resection

Although multirrooted teeth may present difficulties during surgical crown lengthening, root resection of-

fers another way of addressing the problem of inadequate clinical crown length.

In cases of deep fractures or subgingival caries present on one or two roots, the involved part can be removed. This is preferable if crown lengthening will require extensive ostectomy that will create a furcation involvement or jeopardize the support of adjacent teeth. Furthermore, root resection or separation is frequently the best solution when caries extends to the furcation (Figs 2a to 2j).

If root resection is necessary, the following information must be taken into consideration¹⁵:

1. Bone support of the remaining roots
2. Favorable root canal anatomy for adequate endodontic therapy
3. Adequate length for the construction of a retentive cast post and core
4. Prosthetic importance of the remaining roots

Many times molars that require crown lengthening are also involved with periodontal disease. In such cases, lengthening is combined with periodontal therapy. Evaluation of bone support in relation to the part of the tooth involved is necessary before surgery, to decide which root or roots should be removed. This decision is initially based on radiographic and clinical examination (Figs 2c and 2d). The final decision, however, can often be made only during surgery (Fig 2e). In these instances, root canal therapy is also postponed and performed as soon as possible after surgery is completed.

Root resection is usually performed after a flap is raised. This allows evaluation of the extent of subgingival defect and of the bone support of the roots. After removal of the affected root or roots, it is often necessary to reduce the height of the interradicular bone to get adequate exposure of sound tooth structure apical to the resected area (Fig 2f).

This approach is also applicable in cases of root separation. The placement of an additional suture between the two roots during suturing will assist adaptation of the soft tissues in this area, allow healing with favorable contours, and facilitate access for adequate plaque control. Thus, the final prosthetic restoration can be placed beyond the area of root separation without violating the soft tissue and periodontal health can be assured.

The construction of a provisional restoration before surgery has many advantages, because it will facilitate surgical access, proper tissue contouring and healing, and provide esthetics and function to the patient at the

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Figs 2a and 2b Sixty-eight-year-old man with deep subgingival caries under old restorations and crossbite. An extensive subgingival carious lesion on the maxillary left second molar reaches the furcation area.

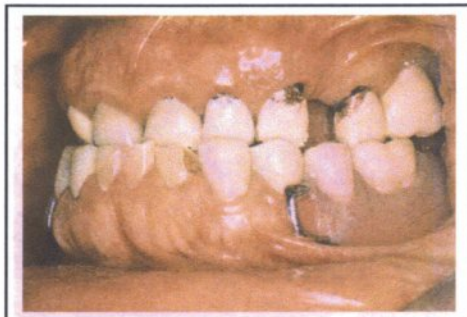
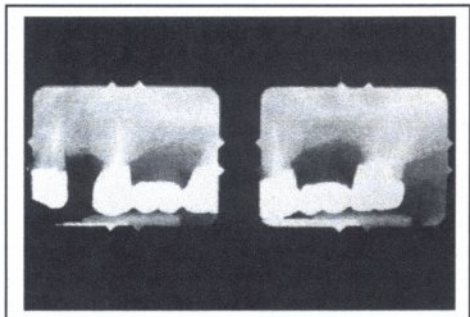


Fig 2b



Figs 2c and 2d Carious second molar, a critical distal abutment. The carious buccal roots are covered with soft tissues.



Fig 2d

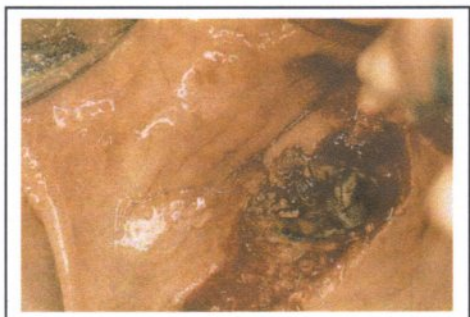


Fig 2e Flap reflection, revealing that only the palatal root can be saved.



Fig 2f View after ostectomy around the palatal root. The buccal roots were extracted before the ostectomy to lengthen the clinical crown.

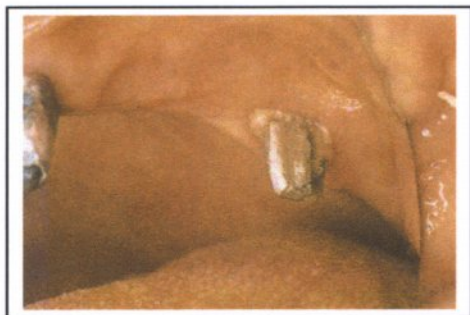


Fig 2g Palatal root 2 months postoperatively after construction of cast post and core. There is healthy tooth structure for placement of an intracrevicular margin.



Figs 2h to 2j Final restoration 18 months postoperatively. Treatment included crown-lengthening procedures in all maxillary teeth, extraction of the maxillary right canine, construction of cast posts and cores, and correction of the crossbite.

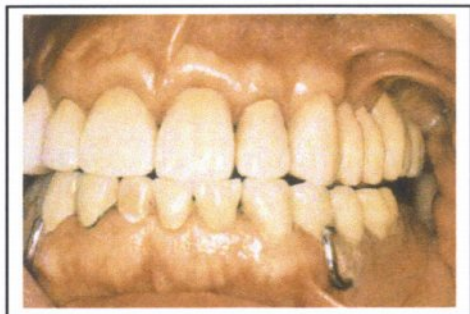


Fig 2i

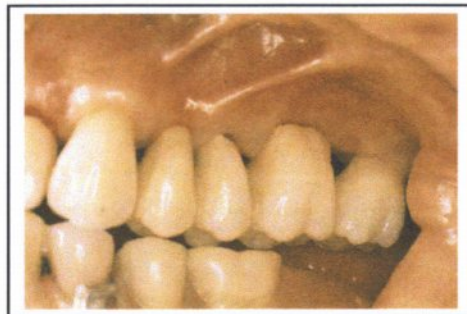


Fig 2j

same time. Adequate time for healing, at least 2 months, is necessary before the final impression is taken.¹²

The margin of the final restoration in the remaining root or roots must extend beyond the area of root separation. The elimination of root concavities facilitates proper removal of plaque (Figs 2h to 2j).

Discussion

When restorative treatment must extend subgingivally, it should be limited to the gingival crevice.^{2,3,16} It is important for the maintenance of periodontal health that the restoration not violate the epithelial attachment. If proper marginal placement requires violation of this

principle, surgical crown lengthening must be performed. This is particularly true for molars, because their strategic position makes them important teeth for a reconstruction. Multirooted teeth present anatomic difficulties for surgical crown lengthening that require certain modifications. However, root resection may be an alternative to conventional surgery when the latter is not possible.

With or without a combined approach, multirooted teeth with subgingival defects or an intact clinical crown with inadequate axial height can be treated successfully, harmonizing the restorative procedures and materials with the supporting biologic environment and ensuring the longevity of the dentition.

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